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ABSTRACT

This paper describes an assessment of community college student knowledge in the liberal arts at two-year colleges in Southern California. A survey instrument with multiple choice questions covering five liberal arts subject areas was distributed to 4,200 students in randomly selected classes at ten colleges. More than 2,500 questionnaires were returned, for a 60% response rate. Key findings include: (1) an association between age and performance in the content areas was observed--older students tended to score higher in English and lower on the mathematics section, which may indicate that living longer and having more exposure to cultural and written materials enhances scores in English; (2) there was a positive relationship between the number of units students had completed in a subject area and the scores obtained on the corresponding section of the test, a relationship that was especially strong in science classes but less significant for humanities classes; (3) students' self-assessments of their abilities in liberal arts subjects were remarkably accurate, showing that community college students are realistic about their academic skills. Appended are: student demographics survey items; a list of sub disciplines and sample questions; and a table illustrating discriminating power of subject area test sections. (Contains 10 references, 9 tables, and 2 figures.) (CB)

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Assessing community college student knowledge in the liberal arts

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Introduction

Courses in English, humanities, math, science, and social science account for more than half the community college credit enrollment, confirming that the liberal arts continue to represent a major curricular function of the community college (Striplin, 2000). The benefits of a liberal arts education are pervasive, including the development of critical analysis, reading, and writing skills and an appreciation for and understanding of cultures and society (Belcher, 1999). A liberal arts education helps develop a free citizenry, capable of weighing complex issues and participating in informed community decision making. In addition, liberal arts constitute the foundation for transfer to four-year institutions. In sum, the learning and skills acquired through a liberal arts education in community colleges foster informed citizens, competent workers, and successful students.

Contemporary calls for institutional accountability typically focus on college-wide policies and practices related to measures such as rate of student retention, completion of programs, and transfer to four-year colleges and universities. These types of indicators have been mandated by state boards in nearly half the states, and in several, special funds have been made available to community colleges where students show gains in these areas (Cohen, 2002).

Increasingly, accrediting agencies have also called for colleges to provide data on student learning outcomes (Seybert, 2002; Summers, 1997). Measuring complex learning outcomes is key to maximizing the quality of education for diverse community college populations, yet defining and then selecting appropriate methods to measure learning has been a challenge for two-year colleges. The General Academic Learning Experience (GALE) study demonstrates a procedure by which cohort-level student knowledge in the liberal arts can be assessed as a function of student characteristics such as the number of courses completed, reasons for

attending college, and self-rated abilities of students. Such assessment at the institutional level can help to inform decision-making from the classroom to the boardroom.

Background

There are a range of methods that have been used to assess community college student learning in the liberal arts, including standardized and locally developed tests, performance-based institutional portfolios, and capstone courses (Seybert, 2002). GALE replicates an earlier effort, the 1983-84 General Academic Assessment (GAA) study completed by the Center for Study of Community Colleges (Cohen and Brawer, 1987). The GAA instrument consisted of a demographic survey and 299 multiple choice test questions distributed among five test forms and administered to over 8,000 students from 23 colleges. The multiple choice items represented a range of knowledge in the liberal arts subject areas of English, humanities, mathematics, sciences and social sciences that might be expected of a student who had taken one introductory course in the related subject.

1983-84 GAA findings

Student knowledge in the liberal arts was found to be positively correlated to age, especially in English usage, social sciences and the humanities – the older the student, the higher the scores in these subject areas. These age-related differences were not found in mathematics or science. All five subject area scores showed a direct positive relationship between the number of units students had completed in the subject area and the scores obtained on the corresponding sections of the test. For example, students who reported taking more social science courses scored higher in the social science sections than students who had taken fewer social science courses. This relationship was most evident in the humanities and the least evident in English. Finally, GAA findings demonstrated the accuracy of students' self-assessments. Students were

asked to compare themselves with other students at their college in terms of their ability to "use algebra to solve problems," "edit written material," and demonstrate similar competencies that suggested knowledge in the liberal arts. High correlations between students' self-ratings and test scores indicate that community college students were realistic about their academic skills, a finding that may prove useful in development of other viable assessment options.

GALE Methods

Procedure

To facilitate development and implementation of the test, GALE participation was restricted to community colleges located in Southern California. In January of 2002, over 50 community colleges in the Southern California areas were contacted by telephone to assess interest in participating in GALE. Over 20 colleges indicated strong or moderate interest in participating and 16 sent representatives to a GALE orientation meeting held at UCLA in February of 2002. Ten of these colleges chose to participate in the GALE study.

Development of the GALE instrument

The current GALE instrument is an updated version of the 1983-84 General Academic Assessment (GAA) instrument that was developed for a similar study of student learning. The GALE instrument consists of two parts: a 7-question demographic survey and a 50-question multiple choice content test split into five liberal arts subject areas (see Table 1 for a listing of subdisciplines by liberal arts subject areas). Demographic information requested included age, high school grade point average (GPA), total number of college courses completed, highest degree earned, reason for attending community college, number of liberal arts courses completed (by subject area), and self-assessment of cognitive skills related to the five subject areas (see Appendix A for a copy of the demographic questions).

Table 1: Listing of subdisciplines with each liberal arts subject area

Subject area	Subdisciplines
English	Reading, writing, decoding and interpreting communication through language
Humanities	Foreign languages, history, literature, art history/appreciation, music history/appreciation, cultural anthropology, religious studies, cultural geography and philosophy
Mathematics	Introductory and intermediate math, applied (technology related), statistics and probability, computer science and technology, remedial math
Science	Chemistry, biology, physics, earth and space sciences, engineering, environmental sciences, agriculture and natural resources, physical anthropology
Social science	Economics, archaeology, anthropology, urban planning, psychology, sociology, political science

Multiple choice items

A bank of 250 liberal arts multiple-choice items was developed by GALE researchers with the assistance of faculty from participating colleges. We started with a review and revision of the original items from the 1983-84 GAA study. These items had been drawn from several sources, including the National Assessment of Educational Progress, Educational Testing Service, City Colleges of Chicago and Miami-Dade Community College. GALE researchers also drew new items from community college faculty suggestions, placement exams, and introductory textbooks in the subject areas.

GALE items were designed to test the level of knowledge expected of a student who had completed one introductory college course in the related subject area. In addition to the sources of items and faculty review process described above, we pilot tested two sections of GALE (English and humanities) in five summer session classes at a non-participating Southern California college. We chose to test English and humanities because items in these two subject areas had undergone the most revision compared to the 1984 instrument. The number of

responses we received did not allow us to perform an item analysis, but we found students missed more humanities than English questions. We subsequently revised those humanities questions that most or all students missed, seeking to improve question clarity and distinction among answer choices.

Ultimately, the 250 items developed for GALE were subdivided into five separate test forms (A through E). Each test form contained 10 items from each of the five liberal arts content areas for a total of 50 items per form. Each of the five 50-item forms had unique questions and was designed to be completed in a 50-minute class period. The ordering of the five subject areas on the different forms was varied to mitigate the possibility that students would consistently underscore on a particular subject area if they ran out of time (see Appendix B for a sample of questions by subject area).

Reliability of the GALE instrument

A multiple-choice test is considered reliable to the extent it is free from random error (Stangor, 1998). To assess the reliability of the GALE instrument, Cronbach's alphas or intercorrelations for scores on items in each ten-item subject area on each test form were calculated (Table 2). All GALE subject areas show acceptable levels of reliability with alphas in excess of 0.7. [1]

[1] While values as low as 0.5 are considered satisfactory for short tests with 10 to 15 items, values of 0.8 or higher are expected of tests with over 50 items (Kehoe, 1995).

Table 2: Alpha coefficients for GALE test items

Form	Alpha Coefficients				
	English	Humanities	Math	Science	Social Science
A	0.73	0.81	0.77	0.85	0.84
B	0.84	0.78	0.75	0.75	0.82
C*	0.85	0.60	0.89	0.75	0.71
D	0.79	0.88	0.87	0.74	0.65
E	0.77	0.89	0.83	0.88	0.70
Average	0.79	0.79	0.82	0.79	0.74
Standard Deviation	0.05	0.12	0.06	0.07	0.08

*Form C had five rather than the usual ten humanities items – see Appendix C for a discussion.

Construct validity

While reliability is a measure of the extent to which students' scores are consistent within subject areas and free from random error, construct validity refers to the extent that GALE measurements (e.g. scores by subject area) actually measure the intended underlying construct (e.g. student knowledge in subject areas). It appears that GALE test items have face validity since many of the items on this instrument were drawn from an existing instrument[2] further informed by community college faculty suggestions, community college placement exam questions, and items selected from introductory textbooks in the subject areas.

Another measure of construct validity is concurrent validity, which checks the correlation of a self-reported measure with a behavioral variable that is measured at the same time. As the results section will show, students' self-rated ability in GALE subject area related skills correlated in a positive and statistically significant way with subsequent subject area test scores. This is another indication that the GALE instrument measures what it intends to measure.

Power of discrimination

An instrument used for assessment should further demonstrate the ability to discriminate among a sample based on the outcome variable being examined. A number of students scored 100% on GALE items within a given subject area indicating that all questions were answerable and it was possible for students to correctly answer all 50 questions. The mean score for performance in each of the subject areas was approximately 50%, a result similar to that reported in the 1983-84 study and falling within the range (between 30% and 80% correct) suggested for items that show adequate power to distinguish among a sample (Kehoe, 1995). The GALE instrument also appears capable of distinguishing between students who have taken classes in a specific subject area and those who have not (see Appendix C).

Random selection of classes and cohort analysis

The class section was used as the unit of sampling for GALE because it was the most feasible way of administering a survey to community college students enrolled in credit classes. One college-level class was randomly selected from each page of a college's fall 2002 class schedule, excluding lab classes, distance education classes, internships, non-scheduled classes, short courses or weekend classes, physical education classes, classes with field trips, and other courses not generally taught in a classroom setting. These types of classes were excluded because students might have been physically difficult to locate for the administration of the instrument, or in a non-lecture setting where exam taking may be difficult. In addition, ESL classes were also excluded because student comprehension of questions could not be assumed.

[2] The 1983-84 GAA was based on items supplied by the National Assessment of Educational Progress, Educational Testing Service, City Colleges of Chicago, and Miami-Dade Community College, all considered reliable sources for community college test items.

This sampling method has the disadvantage of skewing the sample toward full-time students because a student taking three classes has three times as many chances of being in a sampled class as a student who is taking only one class. Nevertheless, the sample, based on duplicated head count, should be an accurate representation of the general student body, since full-time students represent higher proportions of the full-time-equivalent enrollment in the college.

The GALE survey combines item sampling with population sampling. Not all students in the population take the test; no student responds to all the items. The value of this sampling and testing procedure is that testing time is reduced; it becomes possible to administer 250 items as well as a brief demographic section to the sample within one class hour.

A minimum of 12 and 15 classes or 420 students were randomly selected from each of the 10 participating Southern California colleges. The actual number of students who participated in GALE is summarized in Table 3 by institution.

Table 3: Distribution of sample by institution

Institution	Number of participants	Valid Percent
1	303	12.1
2	338	13.5
3	154	6.1
4	266	10.6
5	231	9.2
6	257	10.3
7	296	11.8
8	278	11.1
9	277	11.0
10	107	4.3
Total	2507	100.0

The study averaged a 60 percent response rate with 2507 students responding from an instrument distribution of 4,200. Given the random selection processes used, we expect even the smallest

sample (n=107 from Institution 10) to generalize to the student body with a 90 percent confidence level and 10 percent error. The other samples should generalize at least as well for the purposes of analysis.

The median age of the particpants was 21 years (mode=19 years). An overwhelming majority (84.7%) of the students sampled had not yet earned any type of degree, and over 65% of them indicated that their primary reason for attending community college was to prepare for transfer to a four-year college or university. The median high school grade point average reported by these students was a B average (2.75-3.24)

Aggregate Data Analysis

The following results reflect an aggregate or cohort analysis of results from all participating students. No college, no class, no faculty member and no student are separately identified. Instead, this analysis is intended to examine the broad relationships between student characteristics (including course-taking histories) and knowledge of the liberal arts.

Preliminary descriptive analysis of the aggregate data included running frequencies of each of the demographic variables to examine characteristics of the students sampled. Students' performance within a given subject area and on the total content items was of primary importance in our inquiry of what community college students know. Thus, cross-tabulations and correlations were run between student background variables and scores on individual subject areas and on the total aggregate-of-content items to see if meaningful relationships existed among the variables assessed.

Results and Discussion

Age and GPA

An association between age and performance on the content areas was observed (Table 4). Older students tended to score higher in English and lower on the mathematics sections, reflecting a similar finding from the 1983-84 GAA. It may be that achievement in math is more school-related while scores in English are also enhanced by just having lived longer and having been exposed to more cultural and written materials

Table 4: Correlation of age and high school grade point average (GPA) with performance on content items

	N	English	Humanities	Math	Science	Soc. Science	Total
Age	2395	.070**	.012	-.111**	-.026	.026	-.014
High school GPA	2417	.121**	.061**	.213**	.116**	.057**	.166**

**Correlation is significant at the 0.01 level

While many of the figures listed in Table 4 are statistically significant, they are also small. For example, community college students' high school GPA correlated to performance on all sections of the content items, with all correlations being positive and statistically significant. Conceivably, those students who performed well in high school are also those who have taken more academic classes and have higher GPAs while in college and therefore show higher achievement in the five subject areas. On the other hand, since these correlations are small, the practical influence of other potential predictor variables should be examined.

Number of courses completed

The number of courses that students had taken varied by subject area. For example, as Table 5 indicates, students reported taking the most courses in social science (including economics, archaeology, anthropology, urban planning, psychology, sociology and political

science). Students reported taking fewest courses in science (including chemistry, biology, physics, earth and space sciences, engineering, environmental sciences, agriculture and natural resources and physical anthropology). Table 5 describes overall course taking patterns reported by the GALE participants.

Table 5: Number of courses previously taken according to subject area

Courses Completed in:	N	Mean	Median	Standard Deviation
English	2275	1.83	1.00	2.13
Humanities	2233	2.00	1.00	2.50
Math	2228	2.14	1.00	2.55
Science	2253	1.54	1.00	2.31
Social Science	2267	2.42	2.00	2.63
Total*		14.78	9.00	17.87

*Note "total" refers to the total number of courses that students reported taking at this or any college, not the sum of the mean, median or standard deviation.

Thus, on average we might expect students in this sample to score higher on social science and math than science or English classes. However, reference to the median and standard deviation figures suggest that the data are quite dispersed and that measures other than the mean number of courses taken will be needed to characterize student knowledge.

Uniformly across subject areas, Table 6 results show that the scores from students who have taken three or more courses in a subject area were higher than those who had taken none.

Table 6: Mean scores by number of total completed courses in scale-related curriculum

	GALE Scale*				
Courses Completed in:	English	Humanities	Mathematics	Science	Social Science
None	5.28	3.51	4.56	3.75	4.74
One	6.01	3.89	5.06	4.41	5.21
Two	5.97	3.60	5.43	4.43	5.24
Three or more	5.82	4.16	5.93	4.94	5.50

*The GALE Scale represents the mean number of items on a ten point scale answered correctly.

For example, students who had taken more classes in science scored higher on the science subject area than their peers who had taken no science classes. Similarly, students who had completed a greater *total* number of college courses *regardless* of subject areas typically scored higher overall and higher in most subject areas compared to students who had taken no courses (Table 7) – a finding reflected by the 1983-84 GAA study.

GALE humanities subject area results represent an aberration from this pattern (Table 7). Even students who reported taking more than ten college humanities courses scored little higher on the humanities subject test than student who had never taken a single course (3.80 versus 3.88 mean number of correct answers). Unlike the four other subject areas, the total liberal arts test scores, and the findings from the 1983-84 study, humanities test scores correlate poorly with the total number of non-specific courses that a student had already completed (Table 7).

Table 7: Mean scores by total number of completed courses

	GALE Scale*					
Completed Courses (total)	English	Humanities	Mathematics	Science	Social Science	Total Liberal Arts
0	5.18	3.80	4.79	3.93	4.74	22.01
1-3	5.61	3.70	4.81	4.33	5.06	23.08
4-6	5.66	3.55	4.75	3.89	5.21	22.74
7-9	5.95	3.68	5.13	4.21	5.35	23.97
10 or more	5.94	3.88	5.60	4.26	5.27	24.61

*The GALE Scale represents the mean number of items on a ten-point scale answered correctly.

Most important reason for attending college

Students were asked to choose one of the following to characterize their most important reason for attending college at this time: (1) to prepare for transfer to a four-year college or university; (2) to gain skills necessary to enter a specific occupation; (3) to gain skills necessary to advance in a current occupation; (4) to improve my English, reading or math skills; or (5) to

satisfy a personal interest. As indicated in Table 8, mean test scores vary according to the most important reason students indicated.

Table 8: Mean test scores by reason for attending college

Most important reason for attending college	N	GALE Scale* English	Humanities	Math	Science	Social Science	Total
Prepare for transfer	1531	5.72	3.82	5.50	4.22	5.20	4.9
Gain specific skills to enter a specific occupation	373	5.75	3.56	4.52	4.03	5.08	4.60
Gain skills necessary to advance in current occupation	145	5.37	3.46	4.27	3.81	4.86	4.37
To improve my English, reading or math skills	46	2.94	2.46	3.13	3.00	3.33	2.98
Personal interest	136	5.91	4.05	4.73	4.24	5.09	4.81
Aggregate mean score (standard deviation)	2507	5.62 (2.80)	3.71 (2.75)	5.15 (3.38)	4.11 (2.80)	5.12 (3.03)	4.76 (2.10)

*The GALE Scale represents the mean number of items on a ten-point scale answered correctly.

The 1983-84 GAA results indicated that students attending college for their personal interest scored highest on every subject area, with those preparing for transfer making the second-highest scores overall (Cohen and Brawer, 1987). As the last column of Table 8 indicates, students who were preparing for transfer scored highest overall on average on GALE, followed closely by students who are attending college to pursue a personal interest. Students preparing for transfer scored highest in the individual subject areas of math and social science, while those who are attending college to satisfy a personal interest scored highest on English,

humanities and science. Students seeking to gain specific skills to enter a specific occupation scored higher in each subject area than students who were seeking to gain skills necessary to advance in a current occupation. Finally, as might be expected, students seeking to improve their English, reading or math skills tended to score the lowest on all subject areas in GALE.

Self-assessment of abilities

Before taking the GALE subject area tests, students were asked to rate their abilities relative to other students at their college as "poor," "fair," "good," or "excellent" in the following six areas: (1) understanding the implications of scientific and technological developments; (2) understanding art, classical music, drama; (3) understanding different political ideologies; (4) editing written material; (5) solving mathematical equations; and (6) using logical reasoning to solve problems (see Appendix A). As depicted in Table 9 below, students were accurate in their self-assessments – a finding that is in keeping with the 1983-84 GAA study.

Table 9: Correlation of self-rated ability with performance on content items

Self-Rated Ability to:	N	English	Humanities	Math	Science	Soc. Science	Total
Edit written material	2399	.226**	.157**	.046*	.117**	.120**	.183**
Understand art, classical music, drama	2401	.118**	.123**	-.056**	.061**	.077**	.082**
Solve mathematical equations	2392	.058**	.050*	.332**	.135**	.045*	.191**
Understand implications o scientific technology development	2408	.200**	.164**	.223**	.233**	.154**	.278**
Understand different political ideologies	2389	.190**	.200**	.091**	.176**	.167**	.229**
Use logical reasoning to solve problems	2405	.176**	.145**	.136**	.174**	.145**	.221**

Self-rated ability scales range from 1=poor to 4=excellent

* Correlation is significant at 0.05 level ** Correlation is significant at the 0.01 level

While statistically significant, a number of the correlations in Table 9 are small, suggesting caution should be exercised in practical application of the findings. As an example of the positive correlation between self-rated abilities and test scores, GALE students who rated their ability to "solve mathematical equations" highly also scored better on mathematics items in particular and other subject areas as well. The following box plots further illustrate the relationship between two of the students' self-rated abilities and test scores in math.

Figure 1: Self-rated ability to understand the implications of scientific and technological compared to mean math score

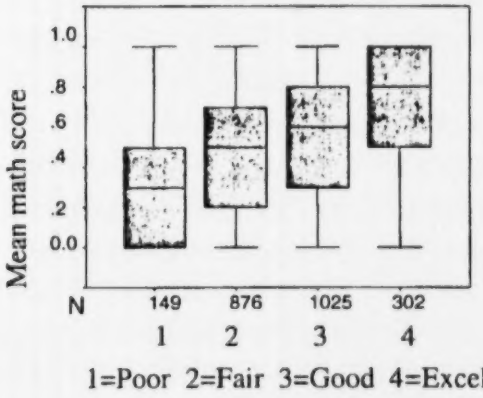
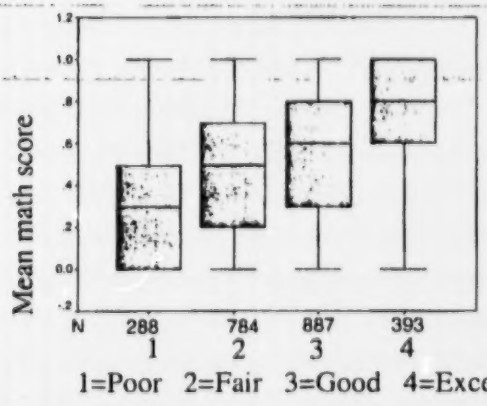


Figure 2: Self-rated ability to solve mathematical equations compared to mean math score



Similarly, higher test scores correlated with higher self-ratings of various abilities for all of the different subject areas. In particular, students' self-rated ability to use logical reasoning to solve problems appeared to be evenly correlated with higher test scores across the five areas, suggesting that the ability to use reasoning to solve problems is useful across a broad range of fields. On the other hand, a negative correlation was observed between students' self-rated ability to understand art, classical music, and drama and their performance on the mathematics section. This finding may speak to the differing nature of humanities and more applied fields such as mathematics. In general, students appeared to have a sense of their relative knowledge and abilities and that sense was reflected in test scores for each of these areas

The General Academic Learning Experience (GALE) study demonstrates a procedure by which cohort-level liberal arts student knowledge can be assessed as a function of student characteristics such as the number of courses completed, reasons for attending college, and self-rated abilities of students. While there was not a perfect correlation between student characteristics and subject area performance, students who answered at least seven of ten questions correctly in a particular subject area tended to differ from those students who answered three or fewer questions correctly.

High and low scoring student profiles

For example, students who answered seven or more English questions correctly (n=1102) had taken an average of three more college courses and one more English class than their lower scoring peers (n=533). Students answering seven or more questions correctly in humanities (n=329) were older (27 versus 25 years of age) and had taken three more college courses including one more humanities course than their lower scoring peers (n=1286). Students

answering seven or more math questions correctly (n=980) were younger than lower scoring students (n=753) with a median age of 20 years old compared to 22, had taken a greater number of college courses (a median of 12 versus 7 for low-scoring peers) including one more math class than their lower scoring peers. Also, high scoring math students were more likely to name preparing for transfer to a four-year college or university as the most important reason for attending college at this time (71 percent compared to 53 percent of lower scoring students). Students who had answered seven or more of ten science questions correctly (n=960) had taken one more science course on average than students answering three or fewer questions correctly (n=650). High scoring science students (n=540) most often had taken one more science course and rated their ability to understand different political ideologies and their ability to understand implications of scientific/technological developments higher than lower scoring students (n=936). Students who answered seven or more social science items correctly (n=650) followed similar though somewhat weaker patterns of differentiation seen in the subject areas above compared to lower scoring students (n=960). Students who scored higher in social science typically had taken more courses overall, more courses in social science, and more often rated themselves as better at a skill (in this case, "to understand different political ideologies") compared to lower scoring students.

Humanities subject area

Student scores on GALE humanities items appear unresponsive to an increased number of *general* courses taken. On the other hand, mean GALE humanities scores did increase as students reported taking more *humanities* courses (see Table 6) which suggests the test may be a good measure of humanities knowledge. However, as student scores in the humanities are consistently the lowest of any GALE subject area, it seems likely that the humanities subject area

questions are either too difficult, too specific, or are not linked as firmly to the content of courses that students are taking as are the other subject area questions.

Humanities courses cover a broad range of content (e.g. foreign languages, history, literature, art history/appreciation, music history/appreciation, cultural anthropology, religious studies, cultural geography and philosophy). Knowledge taken from one humanities course may not generalize to another as easily as in math or other more focused subject areas (see Table 1). While interdisciplinary humanities courses might help students respond correctly to a wider range of introductory level humanities questions, interdisciplinary courses are relatively rare. Of the 25 percent of total student enrollment for all humanities courses in 1998, less than one percent enrolled in interdisciplinary humanities courses (Cohen, 2002, p. 322). Thus, it seems reasonable that a student who has taken one or two distinct humanities courses may not score much higher on a broad-based test than students who have taken no courses.

In addition, the predictive power of the GALE humanities section was structurally weakened by selection of topics and content. Specifically, students were asked to include foreign language courses when reporting the number of humanities classes they had taken, but no foreign language items were included on GALE. In future implementations, students should not be asked to include foreign language courses in the humanities count unless the humanities subject area includes foreign language items (see Appendix C for further discussion about error in construction of the humanities section on one of the five forms of the instrument).

Limitations and Future Directions

The GALE instrument is a reliable and a valid tool that differentiates in statistically significant ways among students who showed varying degrees of knowledge in the liberal arts. However, the practical significance of GALE may be questioned in several ways. For example,

while students' scores on the subject area tests show a positive statistically significant correlation with the total number of classes completed, the difference in mean scores between students who have taken zero courses and students who have taken ten or more courses is small, less than one point for any given subject area (Table 7). Further, there was a high rate of omitted answers (mean = 4 omitted answers) on the instrument, which dilutes the predictive power of the instrument. It is difficult to differentiate among students who omitted questions when we do not know the reason for the omissions (e.g. time constraints, lack of motivation to try to do well on the test, lack of knowledge on that item, frustration, etc.).

The lack of great variability in mean test scores as a function of the number of courses taken may be linked to factors at the level of the student, the faculty and the institution. For example, a student who has taken several remedial English and mathematics courses may very well score at a lower level than a student who does not need remedial work and has taken no courses at all. In the future, a means to differentiate between remedial and college level courses would be useful. In addition, the length of time that has elapsed since a student has completed related coursework may account for some of the low variability in test scores at the student level. In future iterations of GALE, it may help define student characteristics by asking students for numbers of courses they have taken within certain timeframes (e.g. two years or less; more than two years).

Implementation of this type of assessment also relies heavily on faculty engagement and their ability to encourage full student participation. Enthusiastic faculty are likely to encourage students to do their best on the instrument. Methods of measuring and engaging faculty interest in tests such as GALE should be examined.

Finally, the number and type of courses offered by an institution should be assessed since it will affect the number and type of courses taken by students. For example, Cohen (2002) reports a trend in community college curriculum toward specialized courses and away from general survey courses. Perhaps students taking more specialized course knowledge in a subject area like humanities will not do as well on an instrument like GALE, which is designed to assess introductory and general knowledge in the liberal arts.

In conclusion, we have presented a reliable and valid method to assess student learning in the liberal arts. A multiple-choice test like GALE also offers ease in assessing community college student knowledge. The convenience and speed of this method of assessment suits the transient nature and busy schedules of both community college students and faculty. The results of GALE might be used to help institutions assess their liberal arts curriculum and guide students toward behavior patterns and attitudes correlated with higher scores on this test.

Of course there are also certain disadvantages accompanying use of content tests such as GALE. What is measured in a content test may be limited to relatively superficial knowledge or learning and there may be difficulty in interpreting the meaning of results due to student guessing and omission on items. Approaches such as interviews, portfolios, or writing samples could be used in conjunction with GALE to provide added depth and validity of assessment (Cohen, 2002; Prus & Johnson, 1994). In truth, while no one method of assessing something as complex as student learning is adequate or without disadvantages, GALE demonstrates one practical method that colleges may find useful in measuring student knowledge in the liberal arts.

References

Belcher, J. (1999). The liberal arts: A necessary foundation. *Community College Journal 69*(6): 24-25.

Cohen, A. M. & Brawer, F.B. (2002). The American Community College 4th Edition. San Francisco: Jossey-Bass Publishers.

Cohen, A. M. & Brawer, F. B. (1987). The collegiate function of community colleges. San Francisco: Jossey-Bass Publishers.

Kehoe, J. (1995). Basic item analysis for multiple-choice tests. *Practical Assessment, Research & Evaluation, 4*(10).

Prus, J. & Johnson, R. (1994). A critical review of student assessment outcomes. *New Directions for Community Colleges 88*: 69 – 84.

Seybert, J. (2002). Assessing student learning outcomes. *New Directions for Community Colleges 117*. San Francisco: Jossey-Bass Publishers.

Seybert, J. (1994, March-April). Assessment of general education. *Assessment Update* 6(2).

Stangor, C. (1998). Research methods for the behavioral sciences. Boston: Houghton Mifflin.

Striplin, J. (2000). "A Review of Community College Curriculum Trend. ERIC Digest. (ED438011)

Summers, M. D. (1997). Improving student learning – The impact of state and accreditation standards. Paper presented at the Annual Conference of the American Association of Community Colleges, Anaheim, CA. (ED 409930).

APPENDIX A: Student Demographics Survey Items

General Academic Learning Exercise

INFORMATION SHEET

Dear Student:

This survey is designed to gain information helpful in planning community college courses and programs. The information it will provide is confidential; your identity will not be revealed in any way. The information will not become part of your college record.

Please use a dark pencil or pen to respond to each question. Make no stray marks on the form. Thank you for your participation.

Dr. Arthur Cohen
Director, Center for the Study of Community Colleges

1. Please fill in the oval corresponding to the letter printed on your question booklet.

○ A ○ B ○ C ○ D ○ E

2. How old are you? ____

3. Please mark your high school grade point average: (Mark only one)

- ○ A (4.0-3.75)
- ○ A-, B+ (3.74-3.25)
- ○ B (3.24-2.75)
- ○ B-, C+ (2.74-2.25)
- ○ C (2.24-1.75)
- ○ C- and below (1.75-0)
- ○ Not applicable

4. How many courses have you completed at this or any college? *Do not include courses now in progress.* ____

5. What is the highest degree you have already earned?

- ○ None
- ○ Associate
- ○ Bachelor
- ○ Master's or Doctorate

6. What is the most important reason that you are attending college at this time? (Mark only one answer)

- ○ To prepare for transfer to a four-year college or university
- ○ To gain skills necessary to enter a specific occupation
- ○ To gain skills necessary to advance in a current occupation
- ○ To improve my English, reading or math skills
- ○ To satisfy a personal interest

7. Indicate the number of college courses you have completed at this or any other college in each of the areas listed below. Do not include credit for courses now in progress. If none, indicate zero.

	0	1	2	3	4	5	6	7	8	9	10+
Communications/English Composition	○	○	○	○	○	○	○	○	○	○	○
Humanities (e.g., Art, Foreign Languages, Literature, Music and Philosophy)	○	○	○	○	○	○	○	○	○	○	○
Sciences (e.g., Astronomy, Biology, Chemistry, Geology, Physics)	○	○	○	○	○	○	○	○	○	○	○
Mathematics and Computer Science	○	○	○	○	○	○	○	○	○	○	○
Social Sciences (e.g., Anthropology, Economics, History, Psychology, Political Science, Sociology)	○	○	○	○	○	○	○	○	○	○	○

8. Compared to other students at this college, how would you rate your ability to do the following?

	Poor	Fair	Good	Excellent
Understand the implications of scientific and technological developments	○	○	○	○
Understand art, classical music, drama	○	○	○	○
Understand different political ideologies	○	○	○	○
Edit written material	○	○	○	○
Solve mathematical equations	○	○	○	○
Use logical reasoning to solve problems	○	○	○	○

FORM C

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APPENDIX B: Listing of subdisciplines and sample questions

ENGLISH USAGE: reading, writing, decoding and interpreting communication through language

SAMPLE QUESTION:

Instructions: Two underlined sentences are followed by a question or a statement. Read the sentences, and then choose the best answer to the question or the best completion of the statement.

The American prison system functions primarily to exact retribution. In Japan, the courts are less concerned with sending people to jail than they are with rehabilitating them.

What does the second sentence do?

A. It supports an idea found in the first sentence.
B. It analyzes an idea stated in the first sentence.
C. It states a contrast to the statement in the first sentence.
D. It exemplifies an idea found in the first sentence.

HUMANITIES: foreign languages, history, literature, art history/appreciation, music history/appreciation, cultural anthropology, religious studies, cultural geography and philosophy

SAMPLE QUESTION:

An interest in beauty and an inner sense of well-being in the presence of the beautiful is studied in that part of philosophy called:

A. logic
B. ethics
C. epistemology
D. aesthetics

MATHEMATICS: introductory and intermediate, applied (technology related), stats and probability, computer science and technology, remedial math

SAMPLE QUESTION

Simplify: $(2a^2b)^2$

A. $2a^2b^2$
B. $4a^2b^2$
C. $4a^4b^2$
D. $4a^4$

SCIENCES: chemistry, biology, physics, earth and space sciences, engineering, environmental sciences, agriculture and natural resources, physical anthropology

SAMPLE QUESTION

Which of the following statements about enzymes is UNTRUE?

A. They are proteins.
B. Substrates attach to their active sites.
C. They change the products that are produced during a reaction.
D. They are reusable.

SOCIAL SCIENCE: economics, archaeology, anthropology, urban planning, psychology, sociology, political science

SAMPLE QUESTION

Economics is primarily the study of:

A. how to make money in the stock market
B. how to operate a business successfully
C. how society manages its scarce resources
D. how the government spends money

APPENDIX C: Discriminating Power of Subject Area Test Sections

Subject Area	Classes completed in subject area	N	Mean Score	Standard Deviation
English	0	793	5.3	.28
	1 or more	1482	5.9	.27
Humanities	0	845	3.5	.26
	1 or more	1388	3.9	.29
Mathematics	0	778	4.6	.32
	1 or more	1475	5.6	.34
Science	0	751	3.8	.27
	1 or more	1516	4.4	.29
Social Science	0	751	4.7	.28
	1 or more	1516	5.4	.31

Subject area test items should separate students who know more about the subject area from student who know less. Using the number of classes completed as a proxy for student knowledge, it appears that four of the five subject areas in the table above are reliable.

For example, the mean science scores obtained by students who have taken one or more science classes ($5.9 \pm .27$) is greater than one standard deviation from those students who have taken zero science classes ($5.3 \pm .28$). Three of the four remaining subject areas show this same clear pattern. The one exception is humanities.

In addition to the discussion of why the humanities section may be unresponsive to students' general course-taking patterns provided in the text, there was also an error in test construction in the humanities section of Form C. A series of linked questions offered five potential answers where the answer sheet allowed for only four selections. This error invalidated 5 of the 10 humanities items in this test form, leaving a total of 45 questions for this test form compared to 50 items on the other four forms. Since the percent of humanities questions that students answered correctly in the aggregate fell within the range of the percent of questions in other subject areas, we used the "percentage of items correct" rather than the "number of items answered correct" as the outcome variable. This adjustment increases the potential error for the humanities section of Form C since it effectively double-weights the remaining five items. A smaller available test base may also limit the stratification in scores observed among students who know more or less in humanities.

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